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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/566,412	01/03/2007	**Jurgen Ruhe**	4587-053593	5528

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EXAMINER	
EOM, ROBERT J	

ART UNIT	PAPER NUMBER
1797	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/566,412	RUHE ET AL.	
	Examiner	Art Unit	
	ROBERT EOM	1797	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *07 October 2009*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-11* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-11* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

1. Applicant's arguments filed 10/07/2009 have been fully considered but they are not persuasive.

Regarding applicant's remarks asserting that the silicon nitride films of Burgmair et al. and Ruther et al. being hydrophilic is incorrect. Throughout the semiconductor and MEMS art, silicon nitride films are generally considered to be hydrophobic. For example, Aoki (US 2001/0021623 A1), see: [0004] "In particular, when a hydrophobic film, such as, a silicon nitride film…"; and Takigawa et al. (USP 6,693,046 B2), see: Claim 5 "…wherein said first hydrophobic insulating layer is made of silicon carbide, silicon nitride…".

Regarding the applicant's remarks towards the inapplicability of the method of Usui to Burgmair, it is noted that the combination of Burgmair and Usui is directed towards a substitution of one known hydrophobic material (Gate Insulator) for another (20FAc), and not to teach a method of manufacture. The motivation being that Burgmair teaches that high levels of humidity have a deteriorating effect on the gas sensor, as the relative humidity background level increases (Burgmair: pg 442, see: Summary), as a result one of ordinary skill in the art would recognize that substituting the SiO2/Si3N4 gate insulator for another insulating material with a greater degree of hydrophobicity (fluorinated polymer films) would result in improved sensor robustness and a cleaner baseline signal.

Additionally, assuming arugendo, that the deposition process of Usui is critical to the combination of Burgmair and Usui, the two references are still combinable. The gate insulator of Burgmair is formed on a conductive silicon substrate, the ionization-assisted deposition of Usui would still be applicable, as the substituted fluorinated polymer film would be deposited upon the conductive silicon substrate, not a layer of SiO2 as the applicant's asserts, and therefore would not require the initial deposition of an electrically conductive metal layer and therefore would not render the device of Burgmair inoperable.

Regarding the applicant's remarks towards claims 6 and 9, Yang teaches a photopolymerization method for attaching a chemical microsensor film (polymerized CD) to an oxide surface. The fact that cyclodextrin is hydrophilic irrelevant to the applicability of the manufacturing technique to other polymeric chemical microsensor film materials such as 20FAc of Usui. The applicant has not provided any evidence to suggest that the 20FAc polymer of Usui cannot be photopolymerized onto the surface of the sensor of Burgmair. Further one of ordinary skill in the art would be well within their ability to select a known technique to improve similar devices in the same way. In this particular instance, photopolymerization provides for the patterning of multiple regions of a selected film.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

4. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

5. Claims 1-3, 5, 7, 8, 10, and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Burgmair et al. (Contribution of the gate insulator surface to work function measurements with a gas sensitive FET), in view of Usui et al. (Ionization-assisted deposition of alkyacrylate and Fluorinated alkylacrylate polymer thin films).

Regarding claims 1, 5, 7, and 8, Burgmair discloses a gas sensor comprising a substrate of a first charge carrier type (Figure 2, see: base layer (not labeled)), whereon

a drain (Figure 2, see: drain) and a source (Figure 2, see: source) of a second charge carrier type are arranged, wherein a channel area is formed between the drain and the source (Figure 2, see: channel) and with a gas-sensitive layer comprising poles between which a gas-induced voltage is produced according to the concentration of a gas which is in contact with the layer (Figure 2, see: gas sensitive film), wherein in order to measure the voltage, the gas-sensitive layer is capacitatively coupled by one of its poles to the channel area over an air gap (Figure 2, see: air gap) and by its other pole to a counter-electrode having a reference potential (Figure 2, see: suspended silicon gate), characterized in that a hydrophobic layer is arranged on the surface of the gas sensor between the gas sensitive layer and the channel area and/or a sensor electrode, which is electrically connected to a gate electrode arranged on the channel area (Figure 2, see: gate insulator). While Burgmair does not explicitly disclose the static contact angle of the hydrophobic layer measured with water and obtained on a planar surface is at least 90°, especially at least 105° and preferably at least 120°. Additionally, Burgmair et al. does not explicitly disclose the hydrophobic layer contains at least one polymer, preferably a perfluoride polymer. Usui teaches a method of depositing fluorinated polymer thin films (p106/C1, see: 20FAc Films) onto substrates using ionization-assisted deposition producing 20FAc thin films with a contact angle of about 94° (p107/Fig. 9). It would have been obvious to one having ordinary skill in the art at the time the invention was made to substitute the hydrophobic Si_3N_4 layer of Burgmair with the hydrophobic 20FAc layer of Usui, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the

intended use as a matter of obvious design choice. In re Leshin, 125 USPQ 416. In the instant case, Burgmair teaches that high levels of humidity have a deteriorating effect on the gas sensor, as the relative humidity background level increases (see: pg 442, Summary) it would have been obvious to substitute the more hydrophobic passivation film of Usui into the gas sensor of Burgmair to produce a cleaner baseline signal.

Regarding claim 2, modified Burgmair discloses all of the claim limitations as set forth above. Burgmair further discloses an electrically conductive guard ring on its surface, which delimits the channel area and/or the sensor electrode leading to the channel area from the channel area and/or the sensor electrode by means of a space (Figure 2, see: guard ring), and further characterized in that the hydrophobic layer is arranged in at least one area of the surface of the gas sensor located between the guard ring and the channel area and/or the sensor electrode (Figure 2, see: gate insulator).

Regarding claim 3, modified Burgmair discloses all of the claim limitations as set forth above. Burgmair further discloses the hydrophobic layer extends continuously over the channel area and/or the sensor electrode (Figure 2, see: gate insulator).

Regarding claim 10, modified Burgmair discloses all of the claim limitations as set forth above. Burgmair further discloses the hydrophobic layer has a surface profiling with projections and depressions (Figure 2, see: channel created in the gate insulator).

Regarding claim 11, modified Burgmair discloses all of the claim limitations as set forth above. Burgmair further discloses the depressions are in the form of slots or

grooves and preferably form a frame or a ring around the channel area and/or the sensor electrode (Figure 2, see: channel created in the gate insulator).

6. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Burgmair et al. (Contribution of the gate insulator surface to work function measurements with a gas sensitive FET), in view of Usui et al. (Ionization-assisted deposition of alkyacrylate and Fluorinated alkylacrylate polymer thin films), as applied to claim 1 above, in further view of Ruther et al. (Surface conductivity of a CMOS silicon nitride layer).

Regarding claim 4, while modified Burmair does not explicitly disclose the hydrophobic layer is separated from the channel area and/or the sensor electrode and delimits the channel area and/or the sensor electrode preferably in a ring or frame like manner. Ruther teaches a capacitive gas sensor based on suspended gate field effect transistors (Figure 1), with a hydrophobic layer that is separated from the exposed electrode and delimits the exposed electrode in a frame like manner (Figure 1, see: silicon nitride passivation layer which frames the exposed electrode). It would have been obvious to one having ordinary skill in the art at the time the invention was made to separate the sensor electrode in the gas sensor of Burgmair et al., as taught by Ruther et al., since doing so enhances signal response when the sampled gas is at a higher relative humidity (Ruther et al., see: Figure 10).

7. Claims 6 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Burgmair et al. (Contribution of the gate insulator surface to work function measurements with a gas sensitive FET), in view of Usui et al. (Ionization-assisted

deposition of alkyacrylate and Fluorinated alkylacrylate polymer thin films), as applied to claim 1 above, in further view of Yang et al. (USP 6,670,286 B1).

Regarding claims 6 and 9, while modified Burgmair does not explicitly disclose that the molecules of the hydrophobic layer are covalently bound to the surface of an adjacent, preferably semi-conductive or electrically insulating layer of the gas sensor, and that the polymer is connected by an intermediate layer that is preferably in the form of a monolayer to an adjacent, preferably semi- conductive or electrically insulating layer of the gas sensor, and further characterized in that the intermediate layer has at least one reactive group anchored on the adjacent layer, and that the polymer is coupled preferably by means of a covalent bond to the intermediate layer. Yang teaches a photopolymerization-based method for the fabrication of chemical sensing films that covalently binds a polymer film (C7/L13-14) onto a intermediate layer (Fig. 1A, see: functionalization layer) which has been covalently bound to a electrically insulating layer (Fig. 1A, see: oxide base; C8/L51-52). It would have been obvious to one having ordinary skill in the art at the time of the invention to use a photopolymerization fabrication method in the chemical sensor of modified Burgmair, as taught by Yang, since doing so allows the patterning of multiple regions of a selected film, or creating a sensor surface containing several films designed to detect different compounds (Yang, see: Abstract).

Conclusion

8. This is an RCE of applicant's earlier Application No. 10/566412. All claims are drawn to the same invention claimed in the earlier application and could have been finally rejected on the grounds and art of record in the next Office action if they had been entered in the earlier application. Accordingly, **THIS ACTION IS MADE FINAL** even though it is a first action in this case. See MPEP § 706.07(b). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no, however, event will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ROBERT EOM whose telephone number is (571)270-7075. The examiner can normally be reached on Mon.-Thur., 9:00am-5:00pm, EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jill Warden can be reached on (571)272-1267. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Tony G Soohoo/
Primary Examiner, Art Unit 1797

/R. E./
Examiner, Art Unit 1797